

**Thematic Integration: Providing a Child-Centered, Interdisciplinary Curriculum
in an Inquiry-Based, Active Learning Environment**

An Honors Thesis (HONRS 499)

by

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A handwritten signature in cursive script, reading "Gretchen L. Reid".

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Abstract

Thematic Integrated Curriculum is not a revolutionary or new concept by any means. It has been tested by many teachers worldwide and has shown to be quite effective in teaching children about the complexities of this world as well as supplying the basic skills needed to make such intricate connections. This paper will explore the history of this curricular approach. It will illustrate the possible successes of implementing this teaching technique. Suggestions will be provided on how to mend the drawbacks experienced by many teachers who previously tried the approach but became intimidated. Finally, there is an exploration of protocol to follow when beginning to use thematic integration in an individual classroom.

Acknowledgements

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Introduction

It is an extremely exciting time to be a teacher. Our world and individual societies are growing at a very quick pace. As new diseases are discovered each day, so are new cures and procedures for correcting the ailments of illness. As industries and innovative uses of power are generated, so are new environmental concerns. Our world is definitely an exciting place to live. There is a plethora of original ideas with both positive and negative outcomes being tapped into on a daily basis. We learn by experiencing these events and by sharing with others that which we have experienced. What is unique about the time in which we live today is that the sharing of global information and experience is within the capability of anyone enrolled in school or with access to the Internet. The Internet is a tool quite reflective of the multifaceted, complex world of which we are a part. Knowledge, experience, desire, and a computer are the core components needed to survive in the technological environments of today and tomorrow. "What does all this have to do with Thematic Integrated Curriculum?", you might ask. Your answer, simply stated, is "Everything." We teach to inspire young minds. We school children so they may become an integral force in our societies. Our goal is that children will learn and eventually become the problem solvers who invent new modes of transportation, discover new celestial bodies, and pass on what they know to the next generation. This cycle is vital to our survival on this planet we call home.

As we move into the twenty-first century, we are becoming aware of a number of educational problems. Statistics are showing an increase in drop out rates and lower test scores. It is time to take a look at the educational systems and the techniques used to inform this important generation of humans. Thematic Integration offers today's classrooms a set of lenses through which knowledge can be experienced. The lenses I speak of are learning centers, cooperative learning structures, writing activities and interdisciplinary projects. Using the thematic approach allows for meaningful connections to be made across and between the curricular disciplines. Personal experiences of the students and surrounding community can be utilized so that understanding and skills are achieved. These are just a few of the opportunities that lie ahead for the passionate teachers ready to make learning come alive for their students.

Definitions

In a study conducted by Collier and Nolan, teachers' perceptions and understanding of integrated, thematic, and interdisciplinary models were evaluated. What they found, as documented in their paper, *Elementary Teachers' Perceptions of Integration*, was that many teachers had an unclear idea of what was meant by each of the three terms (1996). The relevance of this is that the unsuccessful attempts at changing curriculum from a text- and teacher- centered classroom to one of thematic integration, lies not only on the faults of the previous integration models, but on the education and knowledge of the teachers trying to adopt them. Therefore, establishing a set of clarified definitions will be our starting point.

There are a number of definitions available that cover this concept. They range from very short and abstract to quite extensive explanations. However, all have the same general idea on which the whole concept is based. Many of the definitions contain the same criteria needed by a curriculum model in order to be deemed *thematically integrated*. One of the more widely known and accepted is that of Shoemaker (1989) who states, "it views learning and teaching in a holistic way and reflects the real world, which is interactive" (p. 5). Another definition that revolves around the importance of environmental or worldly involvement reads, "an integrated study is one which children broadly explore knowledge in various subjects related to certain aspects of their environment" (Humphreys, Post, and Ellis, 1981, p. 11) (cited in Lake, 1994). There are many definitions available each with its own twist or bend on the concept. However, it is important to consider the fact that no matter what definition is accepted, there are aspects of thematic integration that are overriding and pertain to all.

There are a variety of levels of integration (Lake, 1994). The most simple is that of the integrated lesson. This lesson will only take a class period or two to complete but will cover a handful of disciplines. Teachers may opt to teach a number of these lessons in a structure that is all his/her own. There is the thematic unit or learning center, which is often used in classes today. This model usually takes a week or two to complete. Lawler-Prince, Altieri and Cramer (1996) take an in-depth look at the difference in scale of these two. Often when integration is going to take place in a single lesson or in one

day's exclusive schedule, the webbing structure (or graphic illustration) is used to outline the various discipline concepts being taught and their links to one another. Also when this small-scale integration model is used, a story or piece of children's literature usually provides the base from which all other concepts stem. Only when a teacher begins to plan a thematic unit which is to take place over a longer period, such as a week or two, should the teacher base the unit or series of lessons around an actual theme. R. Routman defines a thematic unit as "an integrated unit only when the topic or theme is meaningful, relevant to the curriculum and students' lives, consistent with whole language principles, and authentic in the interrelationship of the language process (1991, p. 278). It is also recommended that, at this level, the actual themes be not too broad, as you want to thoroughly cover the theme in the scheduled time frame.

Then there is the fully integrated, themed, interdisciplinary curriculum, which takes many weeks or even months to complete. This is the model with which many teachers become confused and/or intimidated. As will be pointed out later, much is required of the teacher(s) interested in building such a curriculum. As stated in Dressel's definition, the result of this sort of teaching device calls for students to notice connections, generate relationships, and thus create a unique mold which is able to be used for further reference (1958). It is important, especially for the full blown curriculum, that a combination of subjects be used, projects are stressed and valued, sources lie mainly outside text books, connections form between concepts, the study is organized (perhaps in a theme), and agility exist within grouping and timing (Lake, 1994).

History

Thematic integrated curriculum is not a new concept; it has been around for the past fifty years. There is even mention of it in its developmental stage as early as 1918. In 1918 Kilpatrick evolved a method that built project studies around student interests, rather than around a preset subject matter. In the 1930s, thirty schools participated in the "Eight-Year Study", an integrated curriculum experiment that demonstrated many

benefits. It was not successful in changing the traditional ways, despite the positive findings (Walker, 1995).

However, there has been heightened interest in the last ten years due to the number of research studies conducted that focus on children's construction of meaning. It is the hope that new exposure will break the cycle and delve into the use of a model which will call for a new way to encode and retrieve information (Walker, 1995).

Many, if not all, teachers throughout history have felt the crunch of too little time and too much information. This could not be more true of today, where we find ourselves in the modern information age. Our ever-expanding knowledge of the world and ourselves has led to a realization that we are amidst an explosion of complexity and speed as we move into the twenty-first century. In order for us to survive and excel in this fast-paced, multifaceted world of tomorrow, we need to begin preparing today. The twenty-first century requires a flexible use of knowledge, where understanding happens at a broader, deeper sense. This understanding has to not only reflect concepts stated within recorded material, but also those found within life events (Lake, 1994). Integration is one way to begin harnessing the complexities of this world. It allows teachers to present new ideas not as isolated experiences, but as meaningful connections.

There are three concepts that are responsible for the most current movement toward curricular integration. The first is the force that is supplied by the research that is focussing on children's brains and the way in which information is absorbed and used again. The learning theorists who are looking at connections of concepts as the most efficient way of learning are conducting this research. The second force behind the current movement is as Lake (1994) states, the "commonsense wisdom of teachers" who now must address life issues on a day to day basis as well as teach content, skills, and critical thinking (<http://www.ssec.org/idis/cohasset/InreCur.htm>). The third force is the rapid changes in technology (Lake, 1994).

As stated earlier, thematic integrated curriculum is not being simply accepted. Teachers are confused as to what it actually is and on what level it can be used. Also, with its fluctuating importance throughout the years, it has not gained a steady name for itself. Fortunately, the idea has made it back into the spotlight and with new force behind it. It is important that teachers take a look and educate themselves on this issue. There is

much work to be done and milestones to be achieved, but the integration model is showing much promise for the children of today. It should not continue to be dismissed.

Research

The "Eight-Year Study" conducted in the 1930s did provide benefiting effects. Students who participated in the study and were part of the experimental group were found to display more intellectual curiosity, a more positive attitude about schooling, and higher achievement in college. There was a recent study done on 15,000 eight graders who were exposed to the integrated curriculum. These students, having been exposed to the integrated curriculum, scored higher on standardized tests than those who were only enrolled in single-discipline subjects (Walker, 1995). According to Lake, there are no detrimental effects on learning when students are involved in a thematic integrated curriculum of study (1994).

As was mentioned in the section devoted to history, there is another category of research that is not directly linked to the studies done on thematic integration, yet is still quite relevant to the topic. This body of research is focused on children's cognitive development. Piaget's (1959) theory states that most children in the years of primary education remain in the stage of concrete operation (cited in Lawler-Prince, Altieri, and Cramer, 1996). Therefore, activities that require students to think about anything abstract or use problem-solving strategies will present a high level of strain. Students of this age, therefore "need meaningful, concrete activities and materials that actively involve them in the learning process" (Lawler-Prince, Altieri, and Cramer, 1996, p. 28).

When looking specifically at a child in the third grade, not only does the child's cognitive development need to be considered, but also the emphasis placed on the learning of a child in this particular grade. Lawler-Prince, Altieri, and Cramer (1996) have made the following observations concerning this emphasis. At this point in a child's schooling, there is a change that begins to take place where the child moves from learning to read to actually reading to learn. These children need to gain independence, seek out new avenues of information, as well as build both reading and listening vocabulary. Looking from this perspective it is not difficult to see that struggling readers may not

even get to the information that is needed for success. Thematic integration might offer hope to these students. Instead of sitting in front of a book that contains unknown vocabulary, unable to unlock the meaning behind these new words, children could be actively involved in a project that has been linked to one of his/her own experiences. With this approach, at least the student has a few skills from which to start to understand new concepts.

Keeping Piaget's idea of the concrete operational stage in mind, S. Krogh had an interesting point about the actual shifting that takes place between subjects that are taught in isolation from all others. Thematic teaching of any type allows the child to be the center of all classroom activity. Classrooms much like those of the traditional segmented approach are often counterproductive. Children must use processing skills to get them from one subject to another, often changing 'gears' multiple times throughout the day. Not only does the actual change cause problems, but also children of this age do not have the cognitive skills to see the relationships between all the pieces of knowledge they are taking in. It is more powerful if students actively encounter the intricate connections between subjects and concepts as they naturally take place in the world (Krogh, 1990).

If other reports and articles are requested, the research is located in three main divisions. There is documentation of curriculum themes and innovations of that nature available on the web as well as in journals. Usually accompanying this type of research is a testimony and evaluation by the teacher(s) who put the curriculum together. The second type of research available is in the form of reports on how to construct an integrated curriculum. There are many different guides follow in getting a curriculum off of paper and into a classroom. Find a model you can identify with and go from there. The final type of research is the least available. These are comparison studies similar to the "Eight-Year Study" mention earlier in this section. These studies have been done, yet documentation is often difficult to locate. However, with research continuing to be done by the learning theorists, this may soon change.

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Walker, D. (1995). *Integrative Education*. Research Roundup. 12(1). (ERIC Document Reproduction Services No. ED 390 141).

Getting Started

For those teachers who are now thoroughly intrigued and convinced that thematic integration is well worth the time and effort, the question they now face is, "how do I get started?" Some teachers will feel more comfortable spending another year researching this teaching technique, others will try to assemble a team that can go through the process together. Neither of these is a wrong course of action. However, with few schools completely devoted to this type of curriculum and with the unstable history explained previously, some principals might be wary of giving their support. Do not let these obstacles stand in your way. Do not let the work ahead of you intimidate you. It can be done and with much success.

The following is some sound advice for those teachers beginning their quest to better the classroom experience for every child they teach. It is recommended that beginning teachers not jump completely into the practice of integration, as success is not likely to follow especially if a teacher is working individually and the school district does not approve of this approach. Teachers should embrace and to use your resources. If there are texts supplied for the classroom and the district mandates that they be used, by all means, use them. However, do not be afraid to add to them. Pick and choose chapters from which to teach, make connections so that the students can experience interdisciplinary concepts. Start on the smaller end of the spectrum. Be careful not to plan units that are full of *fluff*, yet know that a quality unit can be short in length. Set realistic goals. Keep your students' interests in mind. Finally, when you are ready to make the big step, plan only two units per semester, or for most schools, one per nine-week grading period. Use winter and summer breaks to evaluate the units, the students' reactions and success, and your performance. If you are a teacher who has a number of responsibilities outside the classroom such as families or graduate studies, you may be better off planning only one unit per semester (Lawler-Prince, Altieri, and Cramer, 1996).

There is much work to be done, but Kathy Barclay offers this advice, "the dream... does not have to become a nightmare" (1995, p. 211). Educate yourself on how integrated curriculum works and on how to develop one of your own. Gradually present

the new teaching method with smaller units that fit into an already existing curriculum. The development of this new curriculum should be a reflection of the teacher, students, school and community. Meaningful connections need to be made and there must be smooth transitions between themes. Above all else, the students' interests should be reflected in the topics and interactive projects presented, allowing for a positive response (Barclay, Berelli, Campbell, and Kleine, 1995). The best exposure this type of curriculum can get is if teachers who are comfortable, knowledgeable, and passionate about integration actually model it.

The Process

There are many documented models in the references that are listed at the conclusion of this paper. However, the following step-by-step model was generated using two resources. These two models seemed to target the process that Indiana school districts would most like their teachers to use. The reason for this is that the processes both start with the identification of content standards. The first of the two models that were meshed came from chapter one of A. M. Meinbach's, The complete guide to thematic units: creating the integrated curriculum. The second came from a web site entitled Instructional Technology Teachers' Home Page, written by K. Silvio. (*Both of these are fully documented on the works cited page.*)

Step One: Identify the Content Standards

I would suggest starting with those standards written at the nation/state level and work your way through the district's specific standards, then to the school's written statements, finally exploring those goals you would like your students to accomplish in the specific unit of study. In addition to a review of standards, I would suggest taking a look at the position statement on Interdisciplinary Learning, Pre-K - Grade 4 as written by the National Council of Teachers of English located in Appendix A.

Step Two: Decide on a Concept to Serve as the Unifying Theme

Choose a broad idea, a major issue or event that will allow for a number of lessons and activities from which to branch. Keep in mind the curricular topics, issues, problems or concerns, special events, students' interests and literary interests.

Step Three: Formulate a Major Question and Organize the Theme Accordingly

This step contains two parts. First identify a question that will require the students to use the unit's knowledge and experience to answer. Then determine the skills and objectives of the unit as well as the activities the students will have to complete as to develop understanding and appreciation of the elements. One way in which to do this is to create a "Theme Web". (For an example, see pg. 16.)

Step Four: Gather Materials and Resources

There will be a variety of materials needed. Literature, realia, activity sheets and other resources will need to be gathered and sorted through. The first priority belongs to the literature you pick out for the unit.

Step Five: Design Activities and Projects

The activities should be engaging and continually aimed at achieving the objectives and standards. Think of the learning styles of your students and design the curriculum with them in mind. Identify the teaching strategies that will foster knowledge and skills in your students. Emphasize a "hands-on, minds-on" approach to learning. Have the students help generate project ideas.

Step Six: Determine the Kind of Performance Assessments Needed to Demonstrate Achievement of the Goals Preset by the Instructor

Depending on the length of the unit, there will be a number of different assessments leading to a culminating demonstration of knowledge. Identify and develop rubrics when appropriate.

Step Seven: Implement the Curriculum

Do not feel that once you have reached this step, you have to jump into the deep end of the pool with only this teaching model to keep you afloat. This means that if you are just starting or have never taught thematically or integratively, consider easing

into the pool, trying bits and pieces of what you have created. Evaluate the progress, rework components and continue with the curriculum at a pace comfortable to you and the students. The process will grow more comfortable with experience.

Step Eight: Evaluate the Curriculum Periodically and at the Conclusion of the Unit

Kinks will need to be worked out and something that may work for one group of students may not work for another. Keep your ears tuned to the continual progress of the model. Do not hesitate to make revisions, subtractions or additions to the curriculum. The more you use and evaluate your work, the more solid it will become.

Ingredients for Success

Thematic integrated curriculum calls for teachers to put students needs, interests, and potentials first. It is a classroom way of life that allows teachers to be creative and resourceful. You may have the opportunity to utilize and implement a thematic curriculum, which would recognize subject matter, students' needs and society's problems (Collier, Nolan, 1996). Do not fail to overlook the potential of this great opportunity. It will require much work from you, the teacher, but with this type of curriculum, there is a place of significance for every child. Integrated curriculum allows for the education through experiences of diverse races, genders and classes (Walker, 1995). There are many advantages available to both students and teachers, some of which include more time for instructional purposes, the developments of a community of learners, assessments in a more holistic and meaningful manner, self-directed discovery, and realistic opportunities (Meinbach, 1995). This curricular style allows for the ability to make connections, to solve problems by looking at multiple perspectives, and to incorporate information from different disciplines. These will be essential ingredients for success in the future (Lake, 1994).

References

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Genesis

At the genesis of this project nearly two years ago, I had a preconceived notion that at the conclusion of my thesis, I would have a year's worth of useable curriculum written based solely thematic integration. In my mind, the textbooks supplied to schools were a waste of time. However, throughout my studies, I have been enlightened. Today, I stand confident in my work with a simple, small, integrated thematic unit. I know now that in order to achieve the utmost success with this plan of action, one must start somewhere, and it cannot be at the very top. There is still much more that I must learn. There are years of experience that I do not yet possess. Yet, I have begun my quest for a successful curriculum, full of innovations, inquiries, activities and student interests. Instead of following my original proposed idea of designing a nine-week curriculum based on the theme of Ocean Creatures and Environments, I am scaling back. I will demonstrate my skill and knowledge of thematic integration with a two to three week unit plan entitled, *Mysterious Mammals of the Deep Blue Sea*. I am just finishing my undergraduate study, and though I feel I have acquired a great sum of knowledge, I lack the type of experiential base to successfully plan an entire year's curriculum. However, I am thrilled to know that I am taking the proper steps in building experience with this nontraditional teaching phenomenon.

The Sample Unit

Mysterious Mammals of the Deep Blue Sea

Nuts and Bolts: This is a unit of study developed for a third grade class that shall last no less than two weeks and no more than three. Much attention will be given to the language arts and science aspects of this particular. However, all curricular areas will be substantially covered in a variety of projects, writings and inquiry activities. There will also be a strong computer/Internet focus within this unit. It is meant to take precedence during the majority of classroom time. There will, however, be a few times when the thematic unit will be docked so that other important academic and school endeavors are not denied to the students.

Content Standards

English/ Language Arts: (see Appendix B, Pg 32) Students will be focusing on reading and writing for a various activities. Proficiency guidelines 1, 2, 4, and 6 will be predominantly emphasized. The specific skills that will appear within this unit are as follows:

- Selecting a variety of reading materials from the classroom library
- Making comparisons and predictions
- Using literature as one stimulus for writing
- Distinguishing between reality and fantasy

Mathematics: (see Appendix C, Pg 34) Students will be spending a majority of the time developing problem-solving abilities. Student will be introduced to proportional scales and use graphing to make mathematical connections. The proficiency statements that shed more light on these concepts are numbers 1 and 4. The specific skills are as follows:

- Solving word problems that require the use of various problem-solving strategies.
- Use information from stories and surveys to create graphs.
- Use measurement skills to identify and compare the difference of objects

Science: (see Appendix D, Pg 37) Much of the instruction within the discipline of science will generate from proficiency statement #4: The Living Environment. The following are specific skills that will be targeted:

- Stories sometimes give animals attributes they really do not have.
- There is variation among individuals of one kind within a population.
- Most living things need water, food and air.
- Animals eat plants and other animals for food.
- Living things are found everywhere in the world.
- Different animals have external features that help thrive in different kinds of places.

Social Studies: (see Appendix E, Pg 43) A creative project will be carried out in order to emphasize the importance of civic ideals. There will also be a great deal of geography involved as students will follow migration habits and locate pods of whales and dolphins. The following are the specific skills pulled from proficiency statements that pertain to this discipline:

- Locate the major bodies of water on the globe/map and use compass rose and other map symbols while working with migration.
- Exercise the right and responsibility by working together in groups to carry out a common interest project.

Health: (see Appendix F, Pg 45) The majority of this discipline will revolve around the project mentioned above. Students will be dealing with proficiency #3, which concerns environmental health. They will correspond with a non-profit environmental agency.

Unifying Theme

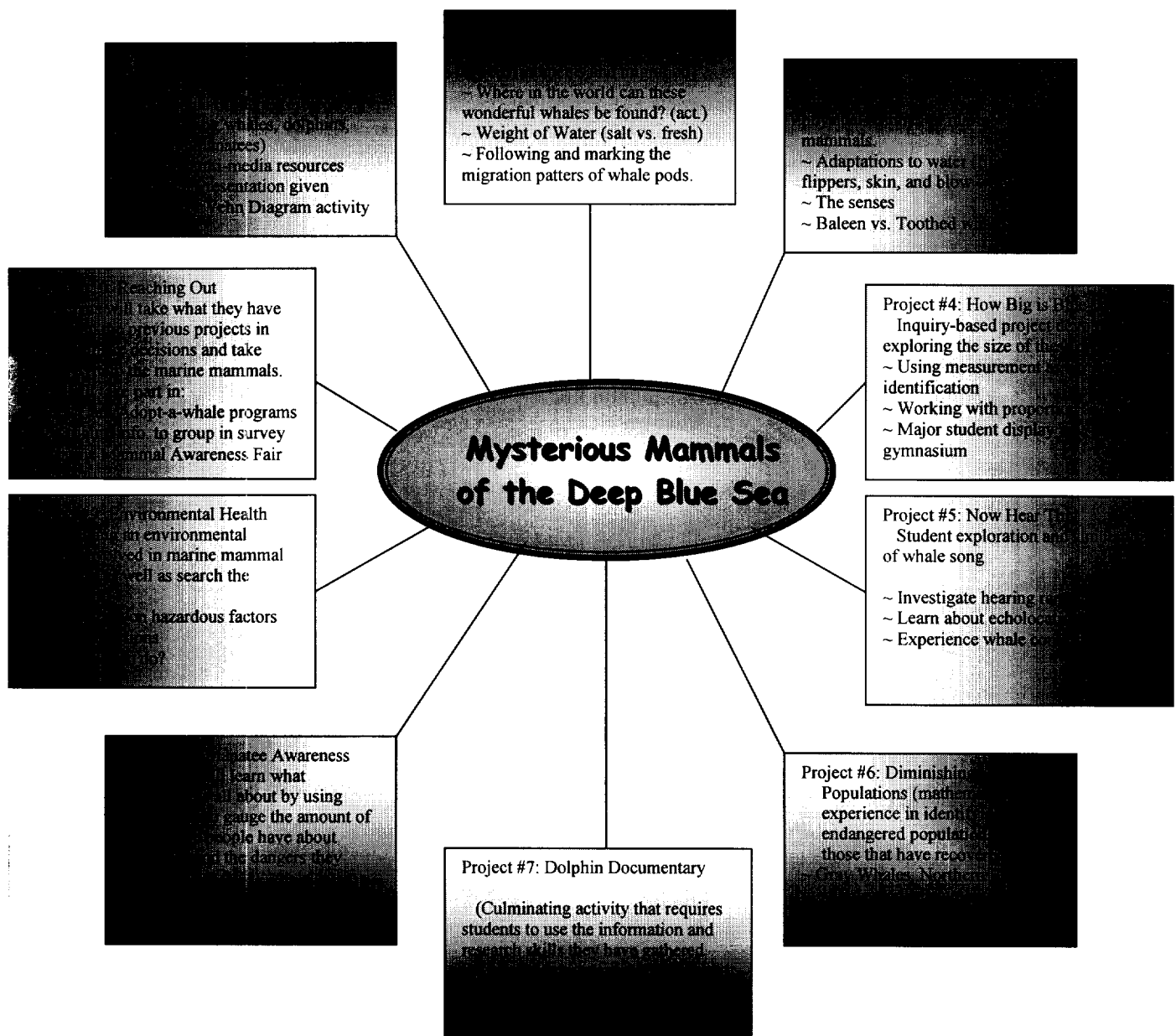
Mysterious Mammals of the Deep Blue Sea ~

(A study devoted to whales, dolphins, and manatees; the environments they live in; the dangers they face; and the help we can provide them.)

Major Question Being Asked

What do marine mammals do for us and what can we do for them?

Thematic Webbing: Graphic illustration of our Unit



The webbing that precedes this dialog is done in a slightly different fashion than that of typical "Theme Webs". The reason for this is that this particular theme is based solely in the projects that construct it. Normally webs will be broken down by subject area. However, each of the projects mentioned above incorporates many if not all the curricular disciplines, in that it is truly a unit of integration. The "theme web" is meant only to provide a simple look at the structure of the unit. Following will be a compilation of lesson plans, activity summaries, resources and a more thorough look at the unit in its entirety.

Motivation and Literature Components

Motivational Set:

The unit will be introduced slowly to the class through the means of a learning center entitled, "**The Masterpiece**".

This learning center is devoted to the development of artistic and musical incorporations of whales and dolphins, either pictorially or musical. Students can go to the lab to see picture/ paintings of whales in their natural habitat. They can learn about different artists, such as Lassen, Wyland, Miller, Talbot and Casay, who all use whales and dolphins as their subject matter. Students can learn about different media that can be used and gain inspiration for their own art projects. On the other hand, they can simply work on the Internet with the number of web-projects available.

Students will visit the learning center throughout the day having finished work early or during scheduled free exploration time.

A list of sound recordings (audiocassettes, CDs, and LPs) can be found at the following address: <http://physicas.helsinki.fi.whale/literature/audio/audiogra.html>

A listening station will be set up in the corner of the room with a number of the selections available so that students can listen to soothing whale song while reading or research how the sound has been used by different composers.

Bringing real literature into classroom instruction

Literature will be used throughout the entire unit, as students will constantly be referring to nonfiction selections for information. However, in order to get the students used to using the different types of books available in the classroom library a number of mini lessons will be taught so that students can identify the difference between reality and fantasy. Each type of literature has its place, but in order to use the information in each, one must be able to identify its genre. In addition, students will be required to read one to

two books a week (depending on length), independently. Students will give various book talks to small groups and the whole class. An occasional book report may be assigned, however, there will be little time to do this once the major projects begin. The book reports will be based on the major story elements.

The following is an Internet address and the first few entries of an extensive bibliography of children's literature that can be used in the classroom library.

<http://www.physics.helsinki.fi/whale/literature/children/biblioc.html>

-
- Adams, Pam. *Wally Whale and Friends*. Auburn, Maine: Child's Play-International, 1981. Grades 4 and up. (Fiction)
- Adkins, Leona. *Ollie the Orca and His Friend the Nurse*. New York: Carlton Press, 1995.
- Albert, Burton. *Sharks and Whales*. Illustrated by Pamela Baldwin Ford. New York: Putnam Publishing Group/Platt & Munk, 1979. Grades 1-6. (Nonfiction) §
- Allen, Joseph. *Mikey Goes Whale Watching*. Illustrated by W. Woodaman. San Diego, California: Ocean Allen Publishing, 1986. Grades 1-5. (Fiction)
- Allen, Judy. *Whale*. Illustrated by Tudor Humphries. Cambridge, Massachusetts: Candlewick Press, 1992. Grades preschool and up. (Fiction)
- Beautifully illustrated story about a young girl and her parents who witness the seemingly magical rescue of a humpback whale and her baby from an oil slick by "the spirits of dead whales." Includes a whale fact sheet.
- Althea. *Whale*. Illustrated by Barbara McGirr. *Save Our Wildlife Series*. Chicago, Illinois: Longman, 1988. (Nonfiction)
- Alvarez, Cynthia. *Moby Dick's Revenge*. New York: David McKay Co., 1996. Grades preschool-2. (Fiction)
- Alvarez, Cynthia, Kathy Suter, and Jack Bernstein. *Ace Venture: Pet Detective*. New York: Random House Children's, 1995. Ages 4-8. (Fiction picture book) (See also below the book of the same name by Marc Cerasini for older readers.)
- Amato, Carol A. *Captain Jim and the Killer Whales*. Illustrated by Patrick O'Brien. Hauppauge, New York: Barron's Educational Series, 1995. Ages 9-12. (Nonfiction)
- From the publisher: "Captain Jim is a wise old fisherman who tells young Zach and Mandy about the creatures of the sea--especially about orcas, or killer whales. Here are dozens of fascinating facts, not only about whales, but about many other sea creatures.quot;
- Ames, Lee J. *Draw 50 Sharks, Whales and other Sea Creatures*. New York: Doubleday, 1989.
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- Andrews, Roy Chapman. *All About Whales*. New York: Random House Books for Young Readers, 1964. Grades 4-5. (Nonfiction)
- Ariel Books Staff. *Whales*. Kansas City, Missouri: Andrews and McMeel, 1996. (Nonfiction)
- Armour, Michael C. *Orca Song*. Illustrated by Katie Lee. Narrated by Peter Thomas. Washington, D.C.: Smithsonian Institution, 1994/Norwalk, Connecticut: TMC/Soundprints, 1994. Grades preschool-2. (Fiction)

Project #1: Getting to know the marvelous mammals

Specific Objectives:

1. The students will be able to name seven characteristics pertaining to a specific whale.
2. The students will be able to present informational speeches to each's small group and then to the entire class.
3. The students will be able to take part in a culminating activity that will require them to work within a life-size Vehn Diagram, comparing the different whales.

Actions:

The students will each select a name of a whale out of a hat. Depending on the classroom dynamics, you may wish to have students work in pairs. Once they have the name of their whale, direct them to the nonfiction section of the library, encyclopedias, and the Internet resource address list. From these resources the students should identify at least seven different characteristics about the physical appearance of the whale as well as a few facts about its existence (ie. what it likes to eat, its population, its major locations). Give students a day or two to access the information. Once the information has been collected, have them practice presenting to a small group. Finally, have each student give his or her presentations. Encourage students to take notes.

Evaluation:

Being the first project, use the following activity as a means of evaluation. Prepare a number of different Vehn Diagram sequences using the characteristics presented in class. Have two large ropes situated as two interlocking circles. Identify one circle as "A" and the other as "B". Announce the characteristics that should stand in each circle. At this point, each student will represent the whale he or she investigated. Take snap shots of the diagram from above. If time allows, have pictures developed and display them in class. Place on a poster and label the diagrams. Allow students to look at the similarities and differences shared by the whales.

Project #2: Oceans All Over

Specific Objectives:

1. The students will be able to locate and label the oceans on a blank globe.
2. The students will be able to describe the different types of water bodies (salt and fresh).
3. The students will be able to locate the major areas where specific whale pods populate and migrate.

Activity A: the following activity came from URL address:

http://www.seaworld.org/killer_whale/oceansallover.de.html

Killer whales inhabit all the oceans of the world. They are most numerous in the Arctic, the Antarctic, and areas of cold-water upwelling. Killer whales are found in both the open ocean and coastal waters.

Materials: large round piece of fruit, globe, world maps, nontoxic pens, paper

Actions

1. Ask students to bring a large, round piece of fruit such as a honeydew melon, grapefruit, orange, or apple from home.
2. Give students access to globes and/or world maps.
3. Students draw and label the world's oceans on their piece of fruit. If there is room, students label seas, major straits, and bays.
4. Have students pair up. Write the questions at right on the board, and have each pair work together to write down the travel directions. Remind them to use directional terms like "travel south," "turn left," etc.
5. When everyone has finished, ask students to share their answers with the class. (Remember, there is usually more than one way to get from one place to another.)

Questions:

1. How do you get from the Arctic Ocean to the Indian Ocean?
2. What is the best way to get to the Mediterranean Sea from the North Pacific?
3. Describe the route from the Sea of Japan to the Arabian Sea.
4. You live in the Indian Ocean, and your friend lives in Baffin Bay. Where could you meet that would be a halfway point?
5. You live in the cold Greenland Sea, and have decided to visit the warm waters of the Coral Sea. Describe the route you will take.

Extension:

Having practiced with the self-made globes, access the migration patterns of a pod of whales from the Internet. Talk the students through the whales' journey, while they follow along marking their globes. The following website is devoted to migration of whales: <http://www.athena.ivv.nasa.gov/curric/oceans/whales/index.html>

Activity B: the following activity came from URL address:

<http://www.seaworld.org/manatee/weightwateract.html>

Discovering that salt water is more dense than fresh water.

Materials: wide-mouth pint jar, fresh egg, large serving spoons, water, gallon milk jug full of water, empty gallon milk jug, measuring cup, pencil, crayon, plastic paper clip, and eraser, and salt

Actions

1. Lead the students into a discussion about why a manatee needs to float (breath air) and why it needs to sink (find food). Explain that manatees float very well due to their body fat and large lungs. The manatee's heavy bones help them sink. Ask students if they can float.

Project #4: How Big is Blue?

The following activity came from URL address:

http://www.seaworld.org/baleen_whales/howbig.html

Objective: Given a rope marked with the lengths of several whales, the student will be able to compare the lengths of these whales. Given illustrations of whales, the student will be able to explore changes in scale and proportional relationships.

Materials: one 30-m (about 100-ft.) rope, measuring tape, ten different colors of tape or felt pens, butcher paper, pencils, protractors, and various whale illustrations (found on web site)

Action:

Choose several whales (including the blue whale) from the illustrations.

Part One: Measuring

Make a "whale rope" to estimate, make, and use measurements. Using a different color of tape or a different color felt pen for each whale you have chosen, mark the lengths of the whales on the rope. On a piece of paper or cardboard, make a color key to go along with the rope.

Do this activity outside or in the school auditorium. (If you do the activity inside, ask the students to predict what kind of whale would fill the room.)

Select two student volunteers to slowly unroll the whale rope. Have them stop unrolling each time they reach a colored marker. At each marker, ask students to guess which whale is as long as the unrolled rope. Tell the name of the correct whale and continue to unroll the rope until you have named all whales.

Part Two: Scale drawings

Photocopy the pictures, names, and lengths of the whales you have chosen.

Divide the class into about ten groups. Distribute one whale illustration, butcher paper, and pencils to each group. Each group's piece of butcher paper should be large enough for a life-size drawing of their whale.

Students measure lengths, areas, and angles.

Students create life-size scale drawings of whales on the butcher paper.

This activity will probably take several days. Display life-size whale drawings in your school's auditorium, library, or hallways.

Project #5: Now Hear This

Activity A

The following activity came from URL address:

http://www.seaworld.org/killer_whale/nowhearthis.de.html

Objective: The students will be able to investigate their hearing frequency range.

Background:

Killer whales have a well-developed, acute sense of hearing. They have responded to tones within the frequency range of about 0.5 to 100 kHz. Their peak sensitivity is about 15 kHz. Humans can hear sounds within the frequency range of about 0.02 to 17 kHz.

Materials: dog whistle, bell, metal clicker, bike horn, and two plastic soda bottles

Action

1. Explain to students that killer whales, like other dolphins, have very good hearing. Hearing is one way living creatures learn about their surroundings.
2. Tell students that all this week they will be taking part in a hearing experiment. Show them the dog whistle, bell, metal clicker, bike horn, and two plastic soda bottles, and make a noise with each. (Hit the two plastic soda bottles together.) Explain that sometime during recess every day, you will use one of the objects to make a noise on the playground. Ask them to make a hypothesis, a guess, which instrument will be the easiest to hear, and which will be the hardest to hear. Record their hypotheses.
3. Tell students that if they hear the noise, they should take note of which sound they hear and where they are on the playground. Encourage students not to discuss what they heard with others in their class, since this might affect the experiment by giving the answer to someone who did not hear the noise.
4. When students come back to the classroom after lunch, have them whisper in your ear what sound they heard. Make a mark on the board for each student who heard the noise (do not tell them what the noise was, or by the last day they will know which instrument is left). Leave the marks on the board, labeled with the day of the week.
5. Ask a few of the students where they were positioned on the playground, and tell them where you were. Did people far from you hear the noise?
6. On the last day, tell students what instrument was used to make noise each day. Ask students which noises were easiest to hear. Which were most difficult? Compare their answers with their hypotheses. What things affect what they heard? (Where they were on the playground, how loud the noise was, etc.)

Activity B: Whale Songs

The following activity can be found at URL address:

<http://curry.edschool.virginia.edu/go/Whales/LessonPlans/WhaleSongs.HTML>

Objectives:

1. The students will be able to state four basic facts about echolocation.
2. The students will experience whale communication and sounds.

Skills: Discussion, listening, following directions, interpretation, critical thinking.

Preparation:

Find an "Echo Spot" on the playground and let children experiment with hearing their own echo before this lesson. To produce an echo of their own voice, children must be standing at least twenty to twenty-five feet away from a wall or building.

Background Information:

This information is to be shared with students prior to completing Procedures and Follow-up Activities:

Many of you had the experience of hearing the echo of your own voice from our "Echo Spot". When you spoke or yelled, the sound of your voice answered you, or was reflected back to you, from an object. Sound reaches your ears in the form of sound waves which pass through the air. Any shape or object that stops the sound waves you send and reflects the waves back to you without changing the shape of the sound produces an echo.

Sound is composed of waves that pass through the air. When the sound waves hit an object, they are interrupted and break up. On land, sound waves do not travel very far without hitting against trees, houses, buildings or whatever gets in their path. These obstacles prevent the sound from traveling to great distances. On very large bodies of water, such as an ocean or on a large lake, there are few obstacles in the path of the sound waves. Therefore, if you are on a large body of water, it is possible to hear sounds for very long distances because there is nothing that interrupts or blocks the path of the sound waves.

Water allows sounds to travel much better than in air. Whales use the sounds they produce to communicate with other whales and to locate things in the water. Whales also hear very well. The Whales send out numerous high pitched sounds which travel through the water and then bounce off objects. The object might be a school of fish, another large sea creature, large rocks or even the ocean floor. The echo of the sounds the whale produces travel back to the whale. The whale can tell how far away the object is by the amount of time it takes for the echo to travel back to them. This is called echolocation.

Actions:

1. Have students place their hands on their throat. Instruct students to say "Whales use echolocation to find things in the ocean." Ask them "What do you feel?" Explain to the class that when they speak, the vibrations they feel in their throat produce sound waves. The sound waves then travel through the air to their ears.
2. Show the class the Diagram of Echolocation. Discuss what types of objects the whale in the picture might find under the ocean.
3. Listen to the sounds of the humpback whale. Discuss what the whales may be trying to communicate to each other.
4. Play the humpback whale sounds again and ask what other sounds students hear in the tape. Discuss how water currents also produce sound waves.

5. Break the class up into two groups - Whales and Divers. Tell the Divers they must swim around the room and try to communicate with the Whales. Tell the Whales they must make whale songs as they swim around the room. Give the students five to ten minutes to experiment with this activity. This activity may get very loud, therefore, loudness level rules must be established or the activity may be done on the playground. Discuss how the Whales and Divers tried to communicate and their feelings in their attempt.
6. Explain that whales have very good hearing and can locate and identify objects even if they can not see them. Choose one child to be a whale. Blindfold and put the "whale" in the middle of the classroom. Have the other children make various noises from different locations around the room. The whale must try to identify the sound and its location. Allow children to take turns as both the whale and the sound makers. Discuss the difficulty of locating and identifying the sounds.

Follow-up Activities:

1. Have children listen to the sounds of the humpback whale again. Ask the children to write a song to one of their favorite tunes about what they think the whales in the tape are trying to communicate.
2. Make a bulletin board entitled "Whale Songs" to display the words to the children's whale songs created in class.
3. Set up a recording studio called "Whale Sounds" with a tape recorder and microphone for students to record their whale songs.
4. Share tape with other classrooms or set up as a listening center within the classroom.

Project #6: Diminishing Populations

Activity Description: In this activity, students will be expanding their knowledge of the population of whales. Students will be visiting Sea World's page entitled "Endangered Whales of the World." There the students will be recording the names of the endangered whales and their known population. From this information, the students will create graphs to illustrate the problem these whales now face. Once the graphs are complete, the students will design posters using the graph as a major object on the informational poster. The intent of creating such as poster is to spread awareness and educate others.

The actual URL address the "Endangered Whales of the World" website can be found is:
http://www.seaworld.org/animal_bytes/endangeredwhales.html

Project #7: Dolphin Documentary

The following activity came from URL address:

http://seaworld.org/bottlenose_dolphin/k3activitydol.html

Objective:

Students will create a "movie" about dolphin natural history.

Materials: plain white paper either standard or legal size, crayons or colored markers, pens and pencils, glue and/or tape, unsharpened pencils, cardboard tubes from paper towels, or 1/4-inch wooden dowels (two per group).

Actions:

1. Ask students if they have ever watched a television show about wild animals before. Let them share some of the information they learned about the animal featured on the program. Tell them they will have a chance to be a movie producer and create a movie about dolphins.
2. Brainstorm with your class and create a list of things they have learned about dolphins. Write the items on a chalkboard or large sheet of paper posted in the front of the classroom. The list might include:

dolphins are mammals.
dolphins live in groups called pods.
killer whales are a large kind of dolphin.
dolphins use echolocation to find food, etc.
3. Divide the class into three groups. Let them decide who will illustrate which facts.
4. Give all groups access to paper, crayons and/or markers, and have them get to work on creating their movie. Remind them to leave room either at the top or bottom of the picture to write what the drawing illustrates (for example: dolphins live in pods, or dolphins eat fish). Remind them to create a title page.
5. When all the drawings are done, students should use glue or tape to join the individual pages together in one long strip. Attach each end of the strip to a pencil, cardboard roll, or dowel. Have students carefully roll the strip onto the right-hand roll. To watch the movie, students slowly roll the paper onto the left-hand roll.
6. Display the movie rolls around the room and allow all students a chance to view the other groups' work, or have each group present their movie to the class.

Project #8: Manatee Awareness

The following activity came from URL address:

<http://seaworld.org/manatee/manawareact.html>

Objective: Students will conduct a survey to investigate the public's manatee awareness and interpret their results in graph form.

Materials: paper and pencils

Actions:

1. Have the students bring graphs from newspapers and magazines to class. Discuss with the students what graphs are and what information they give us.
2. Conduct a sample survey with your class by asking them to vote for their favorite ice cream flavor:
a) chocolate b) strawberry c) other
3. Create a simple bar graph on the board showing the results of the class survey.
4. Divide students into groups of four to five. Have them create four survey questions to investigate how much people know about manatees (review and approve questions). It will be easier for students to graph the results if people are given three ways to respond: two answers and a "don't know" category.

For example:

How many manatees do you think live in Florida?

a) more than 2000 b) less than 2000 c) don't know

5. Have students survey people at school, home, and in their neighborhood. Encourage them to poll at least ten people of different ages and record the ages as they collect the data.
6. Let the students tabulate and graph the responses using the bar graph method. Ask them to make separate charts for each question, showing how people in different age categories answered (they might use 0-15, 16-30, 31-50, and over 50 years as categories).
7. Have the groups create colorful, final graphs to present to the class. As each group makes its presentation, try to track which age group knew the least and which age group knew the most about manatees.
8. Have each group develop a manatee awareness plan for the age group they surveyed that knew the least about the manatee. Posters, flyers, newspapers, or audio-visual presentations can be created to educate the group that scored the lowest on the survey.

Deeper Depths:

1. Using a computer spreadsheet package, have each student create graphs using the information they have gathered. Bar graphs, line graphs, or pie graphs can be created on most software spreadsheet packages. Submit the graphs and an article about the data to the school or local newspaper.
2. Using a bulletin board, have the students develop a graph that compiles all the data they collected on all the groups. Discuss the variation of data between groups.

Project #9: Environmental Health

The basis for this project is to give students the opportunity to use their resources. Students will be contacting environmental agencies involved in marine mammal protection. Many of these agencies will be contacted via the Internet. However, students will be required to write a letter to one of the agencies or even to a congressman to inquire or voice an opinion about the state of health of these gentle giants.

Project #10: Reaching Out

This activity is an extension of the previous. However, instead of simply inquiring about what can be done, the students will actually do it.

Activity A: Kids Care About Whales

found at URL address: <http://whales.magn...au/KIDS/menuek.html>

During the entire unit, students have been creating pictures and posters concerning marine mammal conservation. Now is their chance to put these posters to good use. Simply scan the picture into the computer and email it to: gclarke@magna.com.au or mail a copy of the picture to Whales in Danger, P.O. Box 224, Willoughby 2068, Australia.

These pictures will be posted on the Kids Care web page where anyone can donate money on behalf of your drawing. Show how much you care and spread the news that even the earth's largest creatures could use a helping hand.

Activity B: Generating a handout for those surveyed

During the Manatee Awareness Survey, students learned about what the public knew about these endangered animals. To properly thank them for taking part, a letter should be written. This is the perfect opportunity to also report to them your findings and supplemental information about marine mammal conservation. The students should be the creators of such items.

Activity C: Marine Mammal Awareness Fair

Now that the unit of study is complete, students can share all that they have learned with the school and community. Each project will get a booth. A pair of students at each booth can explain what was done, show examples and answer questions. This fair would be a great way to evaluate the class's effort as a whole as well as give students the opportunity to see their work making a positive difference.

Additional Web Resources for Teachers

Whales & Dolphins-Teacher Resources
by Jennifer Holvoet

List of Sites

1. Whales-Thematic Web Unit
Site Location: <http://curry.edschool.Virginia.EDU/go/Whales/>
This unit can stand on its own as a learning guide. Don't miss the Whale Songs here.
2. Whale Lessons
Site Location: <http://www-sci.lib.uci.edu/SEP/CTS/Whale.html>
Nice tutorials about Gray Whales. The link to J.J. may make the lesson more interesting to some students.

3. Activities Related to Whales

Site Location: http://www.webcom.com/~iwcwww/teachers_kit/tksix.html

A nice archive of activities that can be part, or all, of a thematic unit about whales. Interdisciplinary!

4. Whale Blubber Activity

Site Location: <http://www.teachers.net/lessons/posts/76.html>

A messy but intriguing activity to learn more about whale blubber.

5. Marine Life Unit

Site Location: <http://www.campus.bt.com/CampusWorld/pub/Tictoc/Phase1/>

An excellent collaborative unit with an expert serving as a resource. See if you can get involved. Take a look at the modules which have a somewhat different orientation to the study of whales and dolphins than the other sites.

6. Oceanography Project

Site Location: <http://hillside.sowashco.k12.mn.us/95-96/hammer/lesson/lesson.html>

See Lesson 7 at this site for the lesson specifically about whales. Basically this site is an overview of a unit devoted to Oceanography. It's nice because the lesson really doesn't depend on the internet, unlike many of the other sites in this track.

7. WhaleClub

Site Location: <http://www.whaleclub.com/>

An EarthWatch type site. Though this site has some commercial aspects, it also has a lot of unique aspects and includes information about dolphins. The Keiko cam is quite popular with the kids. The coloring books can give you some additional resources.

8. Protected Marine Species

Site Location: <http://www.rtis.com/nat/user/elsberry/marspec.html>

This site has some fabulous pictures and lots of information. Written on an adult level for the most part.

9. WhaleTimes

Site Location: <http://www.whaletimes.org>

An excellent resource, but one that loads slowly and sometimes won't load at all.

10. Virtual Whale

Site Location: <http://fas.sfu.ca/cs/research/Whales/>

You can listen to whales and see them as they feed. Specific to Humpback Whales.

11. Whales and Babies

Site Location: <http://www.mwsc.edu/~dlk4875/>

Nice short lesson designed by a 5th grade teacher, this looks at different types of whales. Nice for student research. You'll have to scroll past the biography and weather calendar to find the information.

12. Killer Whale

Site Location: <http://www.whaletimes.org>

A very short description of the Killer Whale.

Position Statement on Interdisciplinary Learning, Pre-K-Grade 4

Single copies of this statement are available free upon request, and may be copied without permission from National Council of Teachers of English..

Recent calls for educational reform focus on the need for curricula emphasizing conceptual learning that is integrated across traditional subject areas. Responding to this need, the major national subject-matter organizations--the National Council of Teachers of Mathematics, the National Council of Teachers of English, the International Reading Association, the National Science Teachers Association, the National Council for the Social Studies, the Speech Communication Association, and the Council for Elementary Science International--met to discuss and develop guidelines for integrating the curriculum from Pre-K-Grade 4. A result of their discussions is this position statement, which outlines the principles that should guide the implementation of an integrated curriculum.

Basic to this effort is the belief that educational experiences are more authentic and of greater value to students when the curricula reflect real life, which is multifaceted--rather than being compartmentalized into neat subject matter packages. Interdisciplinary instruction capitalizes on natural and logical connections that cut across content areas and is organized around questions, themes, problems, or projects rather than along traditional subject-matter boundaries. Such instruction is likely to be responsive to children's curiosity and questions about real life and to result in productive learning and positive attitudes toward school and teachers.

The participating organizations believe that educational experiences should help develop children's natural curiosity and their inclination to construct meaning. A focus on relationships across disciplines should encourage creative problem solving and decision making because it makes available to students the perspectives, knowledge, and data-gathering skills of all the disciplines. Such an instructional process should also encourage children to interact with others in a learning community where diversity of thought and culture is valued.

With the above statements in mind, the participating organizations recommend the following guiding principles:

Interdisciplinary Pre-K-Grade 4 curricula should:

1. Maintain the integrity of content drawn from the disciplines by using meaningful connections to sustain students' inquiry between and among those disciplines. Interdisciplinary instruction should be authentic and worthwhile. It is important for students to develop familiarity with the knowledge, assumptions, and methods of inquiry used in many subject-matter areas in order to be able to select that which is most appropriate for any given situation. Major concepts and methods from the various disciplines should be taught as part of integrated units and at times that are appropriate to students' interests and cognitive and social development.
2. Foster a learning community in which students and teachers determine together the issues, questions, and strategies for investigation. An appropriate balance should be maintained between student-initiated and teacher-initiated learning experiences.
3. Develop democratic classrooms. Select curricula and organize classrooms that will cultivate a learning community in which students develop both independence as investigators and the ability to collaborate with each other and with teachers to raise questions, investigate issues, and solve problems. Students should be encouraged to assume increasing responsibility for their learning so that they can gain confidence in their abilities to find information, understand and articulate ideas, and make decisions.

4. Provide a variety of opportunities for interaction among diverse learners--for example, discussion, investigation, product development, drama, and telecommunications. Collaborative interaction among students who differ in abilities, perspectives, experiences, ethnicity, and interests promote learning for all students and fosters positive attitudes towards others and toward learning.
5. Respect diversity of thought and culture. Students should learn by employing a variety of learning strategies, engaging in a wide range of learning experiences, and examining many and varied perspectives.
6. Teach students to use a wide variety of sources, including primary sources, oral communication, direct observation, and experimentation. The use of multiple and diverse sources accommodates various learning styles, interests, and abilities; teaches the importance of cross-checking for accuracy and bias; and develops students' ability to choose the most appropriate and productive sources for investigating specific questions or problems.
7. Use multiple symbol systems as tools to learn and present knowledge. These can include symbols used in language, mathematics, music, and art, as well as those that translate knowledge into tables, charts, and graphs.
8. Use wide-ranging assessments to evaluate both the processes and outcomes of student learning. Ongoing assessment during the inquiry process should lead students and teachers to determine what criteria can be used to identify quality work. Decisions about instruction should be based on a variety of formal and informal assessment strategies that move beyond the exclusive use of objective measures to include observation, portfolios, and performance assessments.

An interdisciplinary education, which draws from the knowledge and processes of multiple disciplines, should encourage students to become active learners equipped with the analytical, interpretative, and evaluative skills needed to solve real-life problems. Eliminating artificial barriers among subject areas gives students a broader context for solving real-life problems.

*The information above was accessed and directly copied from the
National Council of Teacher of English's web site:
<http://www.ncte.org/positions/interd.html>*

Appendix B

English/Language Arts Proficiency Guide: Upper Elementary (grades 3-5)

(Note: all skills that appear in the gray-shaded boxes are skill from previous grades. Yet they are still applicable with the expectation that they be demonstrated at a higher level of development and sophistication.)

1. Exhibit a positive attitude toward language and learning through

• Choosing to read and write during leisure time;
• Asking questions in and out of school;
• Participating in class discussions;
• Expressing ideas and opinions;
• Responding to others' ideas and opinions;

- Selecting reading materials from classroom libraries and school library media centers;
- Writing for personal satisfaction and enjoyment;
- Discussing and recommending printed materials to others.

2. Select and apply effective strategies for reading, including

• Making predictions (conclude) about a text after reading;
• Using context clues to determine the meaning of words;
• Making connections between text and other texts;
• Making connections between text and personal experiences;
• Making connections between text and other media;
• Making connections between text and other people;
• Making connections between text and other events;

- Establishing purpose for reading;
- Making comparisons and predictions;
- Drawing conclusions;
- Using headings, pictures, captions and other textual cues.

3. Comprehend developmentally appropriate materials, including

• Familiar topics, including history, science, and social studies;
• Reading books, including fiction, non-fiction, and poetry;
• Reading newspapers, magazines, and other periodicals;
• Reading reference materials, including encyclopedias, dictionaries, and atlases;

- Stories, chapter books; student writing;
- Audio-visual media and reference materials.

4. Select and use developmentally appropriate strategies for writing, including

• Writing for a purpose and audience;
• Using a variety of sentence structures and punctuation;
• Using a variety of word choices;
• Using a variety of writing styles and formats;

- Using literature as one stimulus for writing;
- Using the writing process – prewriting, drafting, peer sharing, revising and editing;
- Selecting topics of personal interest.

5. Write for different purposes and audiences producing a variety of forms, including

- Writing for different purposes, audiences and needs
- Personal narratives; messages, letters, logs of ideas and information;
- Responses to literature, lists and charts.

6. Use prior knowledge and content area information to make critical judgements, including

- Telling why they like to read and listen to some things rather than others.
- Comparing.
- Making predictions from what they read and hear.
- Making inferences from what they read and hear;
- Identifying cause/effect relationships;
- Distinguishing between fact and opinion;
- Distinguishing between reality and fantasy;
- Choosing topics for writing.

7. Communicate orally with people of all ages by

- Giving and following directions;
- Contributing to class discussions
- Collaborating in groups
- Paraphrasing what others have said
- Story telling.

8. Recognize the interrelatedness of language, literature and culture by

- Understanding the elements of story structure – themes, characters, setting, and plot;
- Understanding the structure of expository text;
- Comparing literature and arts for different cultures.

These proficiency standards and corresponding skills were accessed at the Electronic Library, found on the Indiana Department of Education's web page. The proficiency guide was posted on 09/23/98 and can be found at the following URL address.

http://www.doe.state.in.us/publications/pdf_langeng/engguide.pdf

Appendix C

Mathematical Proficiency Guide: Essential Skills for Grade 3

Statement #1: Develop problem-solving abilities.

- Essential skills:**
1. Formulate problems from everyday and mathematical situations
 2. Solve problems that require the use of strategies such as making a list, drawing a picture, looking for a pattern, etc.
 3. Use manipulatives to solve problems.
 4. Verify results with respect to the original problem.
 5. Investigate new mathematical situations using previously learned knowledge.

Statement #2: Communicate Understanding of Mathematics.

- Essential skills:**
1. Discuss mathematical concepts and relationships.
 2. Draw pictures and use objects to illustrate mathematical concepts.
 3. Write about mathematical topics presented at this level.

Statement #3: Develop reasoning skills.

- Essential skills:**
1. Use addition or subtraction to continue a number pattern.
 2. Identify the missing information needed to find a solution to a given story problem.
 3. Compare and contrast geometric figures.
 4. Verify an answer to a problem.

Statement #4: Recognize and develop mathematical connections.

- Essential skills:**
1. Recognize the relationship between addition and multiplication.
 2. Recognize and develop the relationship between fractions and decimals.
 3. Recognize and develop the mathematical situations occurring in children's literature.
 4. Recognize and develop mathematical applications in social studies, such as graphs, tables and map skills.
 5. Recognize and develop the use of mathematical skills and concepts in science, such as measurement, graphs and data analysis.
 6. Recognize and develop the use of geometry in nature, art, and architecture.
 7. Recognize and develop the use of probability and statistics to describe and predict events that occur in nature.
 8. Recognize and develop the use of money and banking applications.

Statement #5: Develop a sense of whole numbers.

Essential skills: None listed for grade 3

Statement #6: Develop place-value concepts for whole numbers.

- Essential skills:**
1. Identify and write a 3-digit number given a physical model or an illustration of place value model.
 2. Given the number of hundreds, tens and ones, identify and write a 3-digit number.
 3. Given a 3-digit number, identify the number of hundreds, tens and ones.
 4. Identify any 3-digit number in various combinations of hundreds, tens and ones.
 5. Identify the number 1000 as a unit or in various combinations of hundreds, tens and ones

Statement #7: Develop a sense of fractions and decimals.

- Essential skills:**
1. Given a region divided into congruent parts, name and write a fraction to represent a shaded portion.
 2. Given a set of objects, name and write a fraction to represent a subset.
 3. Given a set of fractional models, name and write those that represent equivalent fractions.
 4. Given a fraction, use physical models or illustrations to represent equivalent fractions.
 5. Given a pair of fractions, determine which is larger or smaller by using physical models or illustrations.
 6. Given physical models or illustrations, name and write a decimal to represent tenths and hundredths.
 7. Given a decimal representing tenths, represent it as a fraction using place-value models.

Statement #8: Develop computation and estimation skills for whole numbers.

- Essential skills:**
1. Use manipulatives to develop subtraction algorithms.
 2. Subtract any 2-digit numbers.
 3. Use manipulatives to illustrate an addition algorithm for numbers less than 1000.
 4. Add any two or more numbers less than 1000.
 5. Determine the reasonableness of answers for problems involving addition and subtraction.
 6. Use estimation and mental computation to solve problems where exact answers are not required.
 7. Use manipulatives to illustrate a subtraction algorithm of any two numbers with subtrahend less than 1000.
 8. Subtract any two numbers with subtrahend less than 1000.
 9. Use manipulatives and pictures to represent multiplication as repeated addition or arrays.

Statement #9: Develop computation skills with fractions and decimals.

Essential skills: None listed for grade 3

Statement #10: Recognize, describe, draw, classify, and compare geometric objects.

- Essential skills:**
1. Use the terms points, lines, and line segments in describing two-dimensional shapes.
 2. Draw line segments and lines.
 3. Draw lines of symmetry.
 4. Determine if two-plane figures are congruent by matching.
 5. Identify, describe and draw a kite.
 6. Identify and describe pyramids.

Statement #11: Develop spatial sense.

- Essential skills:**
1. Separate a shape into smaller shapes.
 2. Recognize and make shapes that can be created from a set of three simple shapes.
 3. Identify congruent figures.
 4. Draw figures congruent to a given figure.
 5. Construct three-dimensional objects.

Statement #12: Estimate and measure using standard and nonstandard units.

- Essential skills:**
1. Tell time to the nearest minute.
 2. Measure line segments to the nearest half-inch and quarter inch.
 3. Investigate perimeters.
 4. Add units of length that may or may not require regrouping of inches to feet or centimeters to meters.
 5. Estimate weight using pounds and kilograms.
 6. Estimate capacity using quarts, gallons, and liters.
 7. Given a standard unit, estimate and measure the area of a rectangular region.
 8. Given a standard unit, estimate the area of any region.
 9. Investigate the addition of hour and half-hour time intervals.
 10. Identify the value of any collection of coins and dollars.
 11. Given an amount of money, determine if a purchase can be made.

Statement #13: Use data analysis and probability to analyze given situations and outcomes of experiments.

- Essential skills:**
1. Collect data, construct and interpret picture and bar graphs.
 2. Interpret circle graphs.
 3. Write a story using information from a graph.
 4. Given appropriate information, determine which is most likely or least likely to happen or whether one event is more likely than another.

Statement #14: Use calculators, computers, and other technology.

- Essential skills:**
1. Solve complex problems that require addition and subtraction using the calculator.
 2. Use the calculator to investigate multiplication.

These proficiency standards were taken from the Mathematics Proficiency Guide, edited by B. Blackwell for the Indiana Department of Education. The year of publication for this guide was 1991.

Superintendent of Public Instruction: Dr. Suellen Reed

Mathematics Consultant: Donna J. Long

Appendix D

Science Proficiency Guide: Kindergarten/ Primary Standards

1. Science Habits of the Mind

1.1 Values and Attitudes

Students should:

Raise questions about the world around them and be willing to seek answers to some of them by making careful observations and trying things out.

1.2 Computation and Estimation

Students should be able to:

- Use whole numbers and simple, everyday fractions in ordering, counting, identifying, measuring, and describing things and experiences.
- Readily give the sums and differences of single-digit numbers in familiar contexts where the operation makes sense to them, and they can judge the reasonableness of the answer.
- Give rough estimates of numerical answers to problems before doing them formally.
- Explain to other students how they go about solving numerical problems.
- Make quantitative estimates of familiar lengths, weights, and time intervals and check them by measurements.

1.3 Manipulation and Observation

Students should be able to:

- Use hammers, screwdrivers, clamps, rulers, scissors, and hand lenses and operate ordinary audio equipment.
- Assemble, describe, take apart, and reassemble constructions using interlocking blocks, erector sets, and the like.
- Make something out of paper, cardboard, wood, plastic, metal, or existing objects that can actually be used to perform a task.
- Measure the length in whole units of objects having straight edges.

1.4 Communication Skills

Students should be able to:

- Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.
- Draw pictures that correctly portray at least some features of the thing being described.

1.5 Critical-Response Skills

Students should:

- Ask "How do you know?" in appropriate situations and attempt reasonable answers when others ask them the same question.

2 The Nature of Science and Technology

2.1 The Scientific World View

Students should know that:

- When a science investigation is done the way it was done before, we expect to get a very similar result.
- Science investigations generally work the same way in different places.

2.2 Scientific Inquiry

Students should know that:

- People can often learn about things around them by just observing those things carefully, but sometimes they can learn more by doing something to the things and noting what happens.

- Tools, such as thermometers, magnifiers, rulers, or balances, often give more information about things than can be obtained by just observing things without their help.
- Describing things as accurately as possible is important in science because it enables people to compare their observations with those of others.
- When people give different descriptions of the same thing, it is usually a good idea to make some fresh observations instead of just arguing about who is right.

2.3 The Scientific Enterprise

Students should know that:

- Everybody can do science and invent things and ideas.
- In doing science, often it is helpful to work with a team and to share findings with others. All team members should reach their individual conclusions, however, about what the findings mean.
- A lot can be learned about plants and animals by observing them closely, but care must be taken to know the needs of living things and how to provide for them in the classroom.

2.4 Technology and Science

Students should know that:

- Tools are used to do things better or more easily and to do some things that could not otherwise be done at all. In technology, tools are used to observe, measure, and make things.
- When trying to build something or to get something to work better, it usually helps to follow directions if there are any or to ask someone who has done it before for suggestions.

2.5 Design and Systems

Students should know that:

- People can use objects and ways of doing things to solve problems.
- People may not be able to actually make or do everything that they can design.

2.6 Issues in Technology

Students should know that:

- People, alone or in groups, are always inventing new ways to solve problems and get work done. The tools and ways of doing things that people have invented affect all aspects of life.
- When people want to build something or try something new, they should try to figure out ahead of time how it might affect other people.

3 The Physical Setting

3.1 The Universe

Students should know that:

- There are more stars in the sky than anyone can easily count, but they are not scattered evenly, and they are not all the same in brightness or color.
- The sun can be seen only in the daytime, but the moon can be seen sometimes at night and sometimes during the day. The sun, moon, and stars all appear to move slowly across the sky.
- The moon looks a little different every day, but looks the same again about every four weeks.

3.2 The Earth

Students should know that:

- Some events in nature have a repeating pattern. The weather changes some from day to day, but things, such as temperature and rain (or snow), tend to be high, low, or medium in the same months every year.
- Water can be a liquid or a solid and can go back and forth from one form to the other. If water is turned into ice and then the ice is allowed to melt, the amount of water is the same as it was before freezing.
- Water left in an open container disappears, but water in a closed container does not disappear.

3.3 Processes That Shape the Earth

Students should know that:

- Chunks of rocks come in many sizes and shapes, from boulders to grains of sand and even smaller.
- Change is something that happens to many things.
- Animals and plants sometimes cause changes in their surroundings.

3.4 Structure of Matter

Students should know that:

- Objects can be described in terms of the materials they are made of (clay, cloth, paper, etc.) and their physical properties (color, size, shape, weight, texture, flexibility, etc.).
- Things can be done to materials to change some of their properties, but not all materials respond the same way to what is done to them.

3.5 Energy Transformations

Students should know that:

- The sun warms the land, air, and water.

3.6 Motion

Students should know that:

- Things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow.
- The way to change how something is moving is to give it a push or a pull.
- Things that make sound vibrate.

3.7 Forces of Nature

Students should know that:

- Things near the earth fall to the ground unless something holds them up.
- Magnets can be used to make some things move without being touched.

4 The Living Environment

4.1 Diversity of Life

Students should know that:

- Some animals and plants are alike in the way they look and in the things they do, and others are very different from one another.
- Plants and animals have features that help them live in different environments.
- Stories sometimes give plants and animals attributes they really do not have.

4.2 Heredity

Students should know that:

- There is variation among individuals of one kind within a population.
- Offspring are very much, but not exactly, like their parents and like one another.

4.3 Cells

Students should know that:

- Magnifiers help people see things they could not see without them.
- Most living things need water, food, and air.

4.4 Interdependence of Life

Students should know that:

- Animals eat plants or other animals for food and also may use plants (or even other animals) for shelter and nesting.
- Living things are found almost everywhere in the world. There are somewhat different kinds in different places.

4.5 Flow of Matter and Energy

Students should know that:

- Plants and animals both need to take in water, and animals need to take in food. In addition, plants need light.
- Many materials can be recycled and used again, sometimes in different forms.

4.6 Evolution of Life

Students should know that:

- Different plants and animals have external features that help them thrive in different kinds of places.

- Some kinds of organisms that once lived on earth have completely disappeared, although they were something like others that are alive today.

5 The Human Organism

5.1 Human Identity

Students should know that:

- People have different external features, such as the size, shape, and color of hair, skin, and eyes, but they are more like one another than like other animals.
- People need water, food, air, waste removal, and a particular range of temperatures in their environment, just as other animals do.
- People tend to live in families and communities in which individuals have different roles.

5.2 Human Development

Students should know that:

- All animals have offspring, usually with two parents involved. People may prevent some animals from producing offspring.
- A human baby grows inside its mother until its birth. Even after birth, a human baby is unable to care for itself, and its survival depends on the care it receives from adults.

5.3 Basic Functions

Students should know that:

- The human body has parts that help it seek, find, and take in food when it feels hunger--eyes and noses for detecting food, legs to get to it, arms to carry it away, and a mouth to eat it.
- Senses can warn individuals about danger; muscles help them to fight, hide, or get out of danger.
- The brain enables human beings to think and sends messages to other body parts to help them work properly.

5.4 Learning

Students should know that:

- People use their senses to find out about their surroundings and themselves. Different senses give different information. Sometimes a person can get different information about the same thing by moving closer to it or further away from it.
- Some of the things people do, like playing soccer, reading, and writing, must be deliberately learned. Practicing helps people to improve. How well one learns sometimes depends on how one does it and how often and how hard one tries to learn.
- People can learn from each other by telling and listening, showing and watching, and imitating what others do.

5.5 Physical Health

Students should know that:

- Eating a variety of healthful foods and getting enough exercise and rest help people to stay healthy.
- Some things people take into their bodies from the environment can hurt them.
- Some diseases are caused by germs and some are not. Diseases caused by germs may be spread by people who have them. Washing one's hands with soap and water reduces the number of germs that can get into the body or that can be passed on to other people.

5.6 Mental Health

Students should know that:

- People have many different feelings (sadness, joy, anger, fear, etc.) about events, themselves, and other people.
- People react to personal problems in different ways. Some ways are more likely to be helpful than others.
- Talking to someone (a parent, friend, relative, teacher, or counselor) may help people understand their feelings and problems and what to do about them.

6 The Designed World

6.1 Agriculture

Students should know that:

- Most food comes from farms either directly as crops or as the animals that eat the crops. To grow well, plants need enough warmth, light, and water. Crops also must be protected from weeds and pests that can harm them.
- Part of a crop may be lost to pests or spoilage.
- A crop that is fine when harvested may spoil before it gets to consumers.
- Machines improve what people get from crops by helping in planting and harvesting, in keeping food fresh by packaging and cooling, and in moving it long distances from where it is grown to where people live.

6.2 Materials and Manufacturing

Students should know that:

- Some kinds of materials are better than others for making any particular thing. Materials that are better in some ways (such as stronger or cheaper) may be worse in other ways (heavier or harder to cut).
- Several steps are usually involved in making things.
- Tools are used to help make things, and some things cannot be made at all without tools. Each kind of tool has a special purpose.
- Some materials can be used over again.

6.3 Energy Sources and Use

Students should know that:

- People can save money by turning off machines when they are not using them.
- People burn fuels, such as wood, oil, coal, or natural gas, or use electricity to cook their food and warm their houses.

6.4 Communication

Students should know that:

- Information can be sent and received in many different ways. Some allow answering back and some do not. Each way has advantages and disadvantages.
- Devices can be used to send and receive messages quickly and clearly.

6.5 Information Processing

Students should know that:

- There are different ways to store things so they can be found easily later.
- Letters and numbers can be used to put things in a useful order.

6.6 Health Technology

Students should know that:

- Vaccinations and other scientific treatments protect people from getting certain diseases, and different kinds of medicines may help those who do become sick to recover.

7 The Mathematical World

7.1 Numbers

Students should know that:

- Numbers can be used to count things, place them in order, or name them.
- Sometimes in sharing or measuring there is a need to use numbers *between* whole numbers.
- It is possible (and often useful) to estimate quantities without knowing them exactly.
- Simple graphs can help to tell about observations.

7.2 Symbolic Relationships

Students should know that:

- Similar patterns may show up in many places in nature and in the things people make.

- Sometimes changing one thing causes changes in something else. In some situations, changing the same thing in the same way usually has the same result.

7.3 Shapes

Students should know that:

- Shapes, such as circles, squares, and triangles, can be used to describe many things that can be seen.

7.4 Uncertainty

Students should know that:

- Some things are more likely to happen than others. Some events can be predicted well and some cannot. Sometimes people aren't sure what will happen because they don't know everything that might be causing an effect.
- Often a person can find out about a group of things by studying just a few of them.

7.5 Reasoning

Students should know that:

- People are more likely to believe your ideas if you can give good reasons for them.

8 Common Themes

8.1 Systems

Students should know that:

- Most things are made of parts.
- Something may not work if some of its parts are missing.
- When parts are put together, they can do things that they couldn't do by themselves.

8.2 Models

Students should know that:

- Many of the toys children play with are like real things only in some ways. They are not the same size, are missing many details, or are not able to do all of the same things.
- A model of something is different from the real thing but can be used to learn something about the real thing.
- One way to describe something is to say how it is like something else.

8.3 Constancy and Change

Students should know that:

- Things change in some ways and stay the same in some ways.
- People can keep track of some things, seeing where they come from and where they go.
- Things can change in different ways, such as in size, weight, color, and movement. Some small changes can be detected by taking measurements.
- Some changes are so slow or so fast that they are hard to see.

8.4 Scale

Students should know that:

- Things in nature and things people make have very different sizes, weights, ages, and speeds.

The proficiencies listed above were taken directly from an Indiana Department of Education website.

The guide in its entirety can be found at the following URL address:

<http://www.doe.state.in.us/science/proficiencies.html>

Social Studies Proficiency Guide: Statements and Indicators for Grade Three

Third Grade Focus: The local community and communities around the world

- 1. Citizenship and Government:** Identify the role and the major services provided by local governments.
 - Discuss the reasons why people have governments.
 - Identify specific services that local governments provide.
 - Identify local officials and explain their duties.
 - Suggest the qualities needed to fulfill the duties of a community leader or person with authority.
 - Suggest ways that individuals can participate in the government of their communities.
 - Explain how tax dollars provide some goods and services and why the government may not be able to provide all the goods and services people ask it to provide.
- 2. Historical Perspectives:** Explain the importance of the historical development of the community.
 - Identify significant historical developments, events, personalities, buildings, and places in the community.
 - Identify and discuss changes, which have occurred in the community.
 - Give examples of how other communities in the past or in other parts of the world have changed over time.
 - Predict changes in the community, which may take place in the future.
- 3. Geographic Relationships:** Show how the geographical location of the community relates to the state and nation.
 - Use a compass rose to indicate cardinal and intermediate directions on all maps. Use common map symbols.
 - Identify land and water forms, e.g., oceans, lakes, river systems, continents, islands, mountains.
 - Locate the Equator, Northern Hemisphere, Southern Hemisphere, and North and South Poles.
 - Distinguish political divisions from physical features on maps and globes.
 - Give examples of how a community's location is affected by climate.
 - Give examples and explore patterns of how the community's geographic location affects the way people live.
- 4. Economics:** Explain how people make choices about using goods, services, and productive resources to satisfy their economic needs and wants.
 - Describe how people must work in order to provide goods and services in the community.
 - Identify productive resources (natural, human, and capital resources) in the community that are necessary to produce goods and services.
 - Give examples of how economic resources in the home, school, and community are limited (scarcity) and how people must make choices about how to use these resources.
 - Explain why people specialize in different jobs, and how this causes people to engage in trade and to depend on each other (interdependence).
 - Explain that both parties benefit from voluntary trade.
 - Identify the *opportunity cost* of various consumer and producer choices (the most valuable alternative a person has to give up to something he or she wants).
 - Explain how tools and machines (capital) make people more productive.

5. World Cultures: Examine the contributions of various racial and ethnic groups to the development of the community and the country.

- Determine when students' families and/or early families came to live in the community.
- Identify countries where family members may have lived in the past and consider ways they traveled to reach the United States.
- Identify various community racial and ethnic groups and their places of origin.
- Explain the ways in which people of different racial and ethnic groups help to make the community a better place to live.

6. Individuals and Society: Explore the increasing similarities among groups of people as a result of trade, travel, technology and modern systems of communications.

- Identify different languages and ways people communicate with one another in various parts of the world.
- Compare methods of communication in the past with those of today.
- Identify goods that are imported to and those exported from their community.
- Give examples of ways people live in communities around the world.
- Compare and contrast a different community environment with their own.
- Identify ways technology has helped people adapt to their environment.

7. Current Events: Identify significant current events that influence life in the community.

- Identify ways in which people get current information about their communities and other places in the world.
- Use various sources of information to identify important events and issues in the community.
- Explain how an event may be important to their lives.
- Explain how community leaders use information about current events to make decisions.
- Discuss the relationship of a current event or problem to the present, past or future.
- Identify specific problems or issues in the community and propose possible solutions or outcomes.

8. Inquiry Skills: Use a variety of resources, which include technology, electronic media, and print media to gather information about their community and other communities around the world.

- Give examples of how technology helps people gather and organize information.
- Interpret information about life in the community from simple charts, time lines, pictures, and photographs.
- Use different types of maps to collect data about their community (e.g., county maps, street maps, highway maps, aerial photos).
- Identify different opinions or events and issues from television, newspaper headlines and cartoons, and other media.

9. Civic Ideals and Practice: Demonstrate understanding of democratic ideas through the practice of citizenship skills.

- Explain why it is important to respect the rights and property of others.
- Exercise responsibility by working together in groups to plan and carry out projects and activities.
- Identify rules and laws in the community.
- Explore the ways rules and laws are made.
- Gather and analyze information about national symbols, holidays, and famous citizens.

*The proficiencies and indicators above were taken directly from
The Social Studies Proficiency Guide for Indiana Schools developed in 1996.
Superintendent of Public Instruction: Dr. Suellen Reed
Social Studies Consultant: Mary Fortney*

Appendix F

Health Education Proficiency Guide:

Proficiency Statements and Indicators for Upper Elementary Level (Grades 3-5)

Statement #1: Growth and Development ~ Understand that growth and development is multidimensional, follows a predictable sequence, and yet is unique for each person.

- Discuss how personal choices influence growth and development.
- Identify the impact of different lifestyle behaviors on the processes of growing and developing.
- Cite the effects of heredity and environment on growth and development.
- Describe how growth and development occurs at different rates for body parts, systems, and functions.
- Explain similarities and differences in children's growth and development within and between gender.

Statement #2: Mental and Emotional Health ~ Assess the impact of emotions and stress on self-concept, social behavior, and relationships with others.

- Explain how social and emotional environments contribute to the formation of personality.
- Describe how emotions can be expressed and how they may affect a person physically.
- Describe how personal behavior affects self and others.
- Demonstrate acceptance of responsibility for personal behavior.
- Describe ways to manage stress.

Statement #3: Community and Environmental Health ~ Understand that health promotion/disease prevention is an individual, community, national, and international concern and responsibility.

- Explain how health programs are alike and different from community to community.
- Identify agencies that work to improve the health of the community.
- Identify careers of health professionals.

Statement #4: Nutrition ~ Determine how nutritional intake and eating patterns affect and are affected by physical, social, mental, economic, and cultural factors.

- Describe the food pyramid.
- Identify the nutrients important to good health.
- Apply nutrition knowledge in making daily food choices.
- Explain the link between eating habits and emotions.

Statement #5: Family Life ~ Understand how an individual's relationships influence and are influenced by the family that has evolved as a result of the interaction of social, economic, and cultural factors.

- Describe family roles and responsibilities that contribute to the health of individuals.
- Describe personal qualities affecting peer group relationships.
- Define heredity and classify inherited and acquired characteristics.
- Identify concepts related to sexual growth and development.
- Describe effective parenting skills.

Statement #6: Consumer Health ~ Develop the ability to compare and contrast the factors that influence the individual's responsible selection, utilization, and evaluation of health information, products, and services.

- Explain how family habits and values influence selection and use of health information, products and services.
- Identify medical, dental, and health-related specialists and their roles in providing health services.
- Collect health information, products, and services and seek additional information.
- Apply the knowledge that self-diagnosis and treatment, unwise use of medicine, chemical agents, devices, cosmetics and dietary supplements may be harmful.
- Give examples of the influence of advertising on the purchase of health products.

Statement #7: Personal Health ~ Evaluate and integrate the complexity of forces that influence personal health principles and behavior in decision-making for the attainment of high level wellness throughout the life cycle.

- Explain what influences a proper balance for sleep, rest, and activity.
- Explain why physical activity is essential for good health.
- Explain why good health practices are valuable in maintaining wellness.
- Compare immediate and long-range effects of personal health care choices.

Statement #8: Alcohol, Tobacco, and Other Drugs ~ Recognize that the use of alcohol and other drugs arises from a variety of motivations, and the effects have an impact on the health of the individual, the family, and the community.

- Differentiate among constraints on purchase, possession, and use of alcohol and other drugs.
- Identify reasons why certain individuals might experiment with and possibly become regular users of caffeine, tobacco, alcohol, marijuana, and other drugs.
- Discuss alternatives to alcohol and other drug use including refusal skills.
- Identify effects of peer pressure and refusal skills on individual choices.
- Identify personal consequences of using alcohol and other drugs.
- Discuss chemical dependency and the accompanying health risks.

Statement #9: Intentional and Unintentional Injury ~ Perceive the potential for hazards and accidents in any environment and the application of preventive and emergency measures

- Explain the relationship between human behavior and injuries.
- Demonstrate basic first aid skills.
- Identify resources for help and information in threatening and emergency situations.
- Identify existing and potential safety hazards within the home, school, and community.
- List possible injuries that might occur as a result of domestic or school violence.

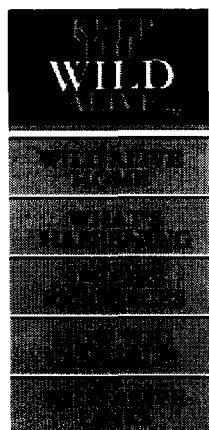
Statement #10: Health Promotion and Disease Prevention ~ Understand the causal factors of disease and disorders and the extent to which certain diseases and disorders can be prevented, treated, and controlled through individual health behaviors.

- Identify causes of diseases.
- Identify ways diseases can be prevented, controlled, or cured.
- Cite examples of the effects of disease upon individuals, groups and communities.
- Discuss how factors, including the desire for fitness/wellness, motivate individuals and organizations to promote and maintain health.

*The proficiencies and indicators listed above were taken from the Indiana Dept. of Education's 1998 publication of The Health Education Proficiency Guide.
Superintendent of Public Instruction: Dr. Suellen Reed
Coordinator of Health Programs: Phyllis Lewis*

WHAT IS A MANATEE?

SAVE
ENDANGERED
SPECIES

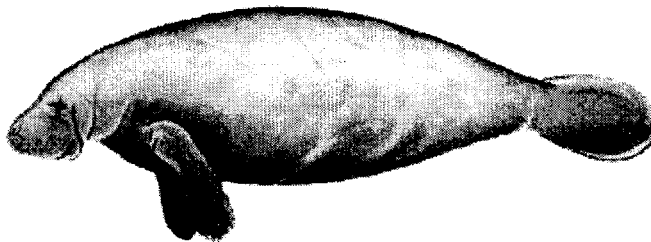


Manatees are marine mammals.

Manatees are mammals that live in warm fresh water and seawater.

They belong to the group or Order *Sirenia* which includes both manatees and dugongs. The five *species* or types of animals in this order include the West Indian manatee, West

African manatee, Amazonian manatee, dugong, and Steller's sea cow. Unfortunately, the Steller's sea cow is extinct.



Heavy herbivores

Manatees weigh about 1,200 pounds and measure around ten feet in length. All manatees are herbivores, they eat plants. In fact, they can eat up to 100 pounds or 10 to 15 percent of their body weight each day. Florida manatees, a subspecies of the West Indian manatee, dine on manatee grass, turtle grass, and water hyacinth.

Moving Molars

A feeding manatee uses its front flippers and muscular upper lips to bring plants to its mouth. Because it has not front teeth, the manatee relies on the thick, ribbed pads in the front of its mouth to help break vegetation into small, chewable pieces. Manatees have an endless supply of molars. A manatee may have six to seven functional molars on each side of its jaw. These grinding teeth form in the rear of the jaw and move forward. As older molars in the front become worn, they fall out and are replaced by new teeth.



Manatee mothers

A female manatee or cow can give birth to a single calf every three years. The calf begins feeding on plants when it's a few weeks old, but continues to nurse from its mother for about 12 to 18 months. Twins are rare.

This long period of nursing allows the calf to learn migration routes, foods, and preferred feeding areas from its mother. Manatees are mostly solitary creatures, but they sometimes gather in unorganized groups of a dozen or more.

Staying submerged

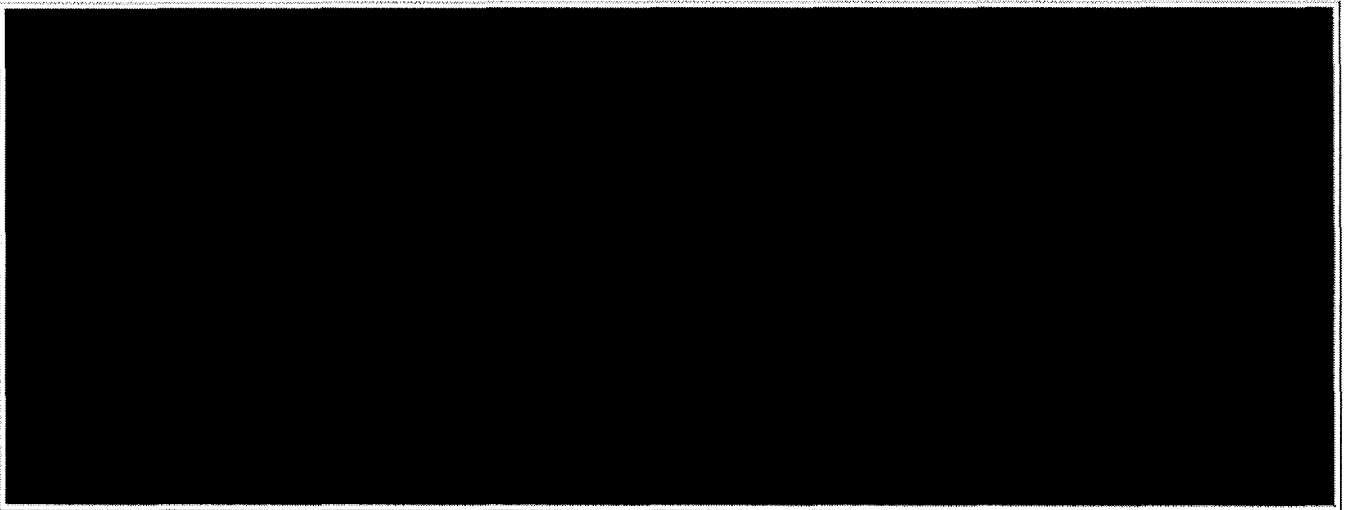
Manatees are usually found at or near the surface. The deepest recorded dive by a West Indian manatee is about 10 m (33 ft.). On average, manatees return to the surface every two to three minutes for air, but can stay underwater for up to 20 minutes. Manatees can renew about 90% of the air in their lungs in a single breath (humans renew only about 10%).

Manatee migration

All species of manatee migrate during particular seasons. West Indian manatees migrate to areas with warmer waters when water temperatures drop below 20°C (70°F). Historically, these manatees migrated south, however many manatees now migrate to power plant outfalls and other manmade, warm-water discharges. In dry seasons, West African and Amazonian manatees migrate downstream or into deeper parts of rivers and lakes to avoid starvation and predation.

Manatee mortality

It's estimated that as few as 1,900 Florida manatees remain in Florida waters. About ten percent die each year. How do they die? Besides natural causes of death, many are injured and killed in accidents involving boats (boat impact and propellers cause severe injuries). Entanglement, ingesting garbage in the water such as fishing line and hooks, habitat destruction, and poaching are other threats to the manatee's survival. If they continue to die at this rate, this **endangered species** could become **extinct** in the next few decades.



For more information on manatees, visit [Manatees - Animal Resource](#)
For teachers - [Classroom Activities](#)



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MANATEES

Habitat and Distribution

A. Distribution.

1. All living sirenians are found in warm tropical and subtropical waters.

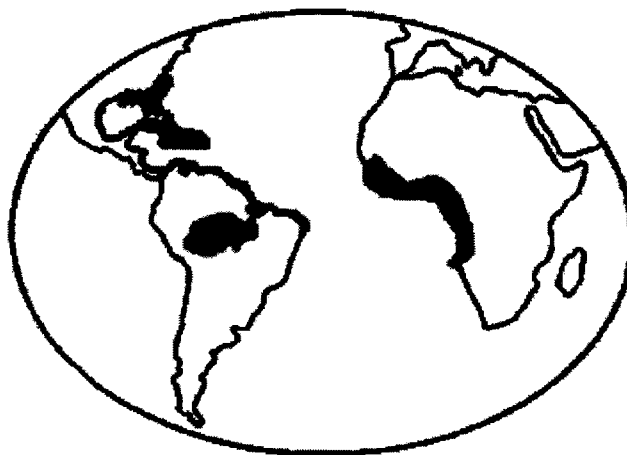
2. The West Indian manatee was once abundant throughout the tropical and subtropical western North and South Atlantic and Caribbean waters. However, the manatee's numbers have been greatly reduced. Today the West Indian manatee is listed as an endangered species throughout its range.

a. The range of the Florida manatee is primarily peninsular Florida, but extends as far north as Virginia and as far west as Mississippi.

b. Antillean manatees have a patchy distribution throughout the Caribbean including Mexico, southern Texas, and northeastern South America. The southern range extends through Central and South America to Brazil.

3. West African manatees range from Senegal to Angola, on the west coast of Africa.

4. Amazonian manatees are the only species of manatee confined to fresh water. They inhabit the Amazon Basin, mostly in Brazil. They are uncommon and close to extinction in Ecuador, Peru, and Columbia.



■ Florida manatee ■ Antillean manatee ■ West African manatee ■ Amazonian manatee

B. Habitat.

1. The West Indian and West African manatees inhabit rivers, bays, canals, estuaries, and coastal areas rich in seagrass and other vegetation. They can live in fresh, saline (salt), and brackish water. They move

freely between salinity extremes.

a. West Indian manatees may be found in any waterway over 3.25 ft. (1 m) deep and connected to the coast. They prefer water above 70 degrees F (21 degrees C). Florida manatees rarely venture into deep ocean waters. However, there are reports of manatees in locations as far offshore as the Dry Tortugas Islands, approximately 50 mi. (81 km) west of Key West, Florida.

b. West African manatees live in quiet coastal areas, large rivers, lagoons, and connected lakes, where the water temperature is above 64 degrees F (18 degrees C).

2. Amazonian manatees are restricted to fresh water. They are most common in floodplain lakes and channels.

3. The patchy distribution of manatees throughout all their ranges is due to the distribution of suitable habitat: plentiful aquatic plants and a

C. Migration.

1. Florida manatees move into warmer waters when the water temperature drops below about 68 degrees F (20 degrees C).

a. Historically, manatees have migrated into warmer waters during the colder months of the year. On the Gulf coast, manatees congregated at natural warm-water springs. On the Atlantic coast, manatees headed south of the Sebastian River.

b. Today, power plant outfalls and other warm-water discharges are important winter destinations for many manatees.

(1) Among the most important of the artificial warm-water discharges are the Florida Power and Light Company's power plants at Cape Canaveral, Fort Lauderdale, Port Everglades, Riviera Beach, and Fort Myers, as well as the Tampa Electric Company's Apollo Beach power plant in Tampa Bay, Florida.

(2) These artificially heated sources have allowed manatees to remain north of their historic wintering grounds.

(3) More than 200 manatees congregate at some power plants during cold weather.

2. In dry seasons, West African and Amazonian manatees migrate downstream or into lakes or deeper parts of a river.

D. Population.

1. The Florida manatee is an endangered species. In Florida, the manatee population numbers only about 1,900.

2. Population studies on Antillean, Amazonian, and West African manatees are inadequate to determine reliable population numbers.

3. Populations of all species of manatees have apparently declined over the past hundred years.

[Scientific Classification](#) | [Habitat and Distribution](#) | [Physical Characteristics](#) | [Senses](#) |
[Adaptations for an Aquatic Environment](#) | [Behavior](#) | [Diet and Eating Habits](#) | [Reproduction](#) |
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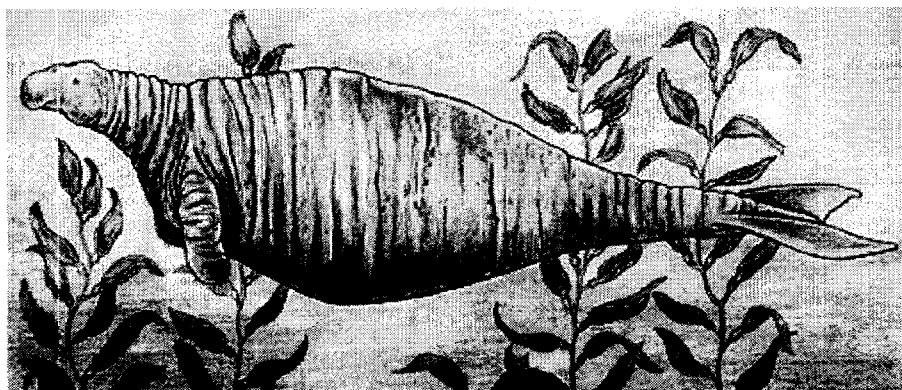
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MANATEES

Conservation

A. Endangered species.

1. All four species of sirenians are endangered or threatened. A fifth species, the Stellar's sea cow, was discovered in 1741 and hunted to extinction by 1768.
2. The Florida manatee is one of the most endangered marine mammals in the United States.



The Steller's sea cow was discovered in 1741. Less than 30 years later it was hunted to extinction.

B. Legal protection.

1. All species of manatees are protected to some extent by national or local acts in every country they occupy.
2. Federal and state laws have been passed that protect Florida manatees.
 - a. Federal laws prohibit hunting, capturing, killing, or harrassing these animals. These laws include the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973.
 - b. The Florida Manatee Sanctuary Act of 1978 is state legislation establishing Florida as a sanctuary for manatees.
3. West African manatees are protected under Class A of the African Convention of Nature and Natural Resources, signed by 38 African countries.
4. Amazonian manatee hunting has been prohibited since 1973.
5. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international treaty developed in 1973 to regulate trade in all wildlife species. All species of sirenians are protected by this treaty.

C. Education.

Public awareness and education programs in Florida have been effective in increasing boater awareness, providing legislators with important manatee information, and educating the public about manatees.

D. Marine zoological parks.

1. Marine zoological parks, such as Sea World of Florida, help conserve manatees. Sea World of Florida is authorized to rescue and rehabilitate ill, injured, and orphaned manatees.
2. The first priority of the Manatee Rescue and Rehabilitation program is to return healthy manatees to their natural habitat.
3. In the controlled environment of a marine zoological park, scientists can study aspects of manatee biology that are difficult or impossible to study in the wild.
4. Having manatees at marine zoological parks provides the opportunity for the public to learn about these animals.

An activity appropriate for 4-8 grade students

An activity appropriate for 9-12 grade students



[Scientific Classification](#) | [Habitat and Distribution](#) | [Physical Characteristics](#) | [Senses](#) | [Adaptations for an Aquatic Environment](#) | [Behavior](#) | [Diet and Eating Habits](#) | [Reproduction](#) | [Birth and Care of Young](#) | [Communication](#) | [Longevity and Causes of Death](#) | [Conservation](#) | [Books for Young Readers](#) | [Bibliography](#) | [Index](#)

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